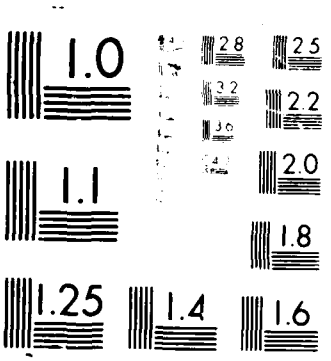
AD-A188 761 TECHNOLOGY DEVELOPMENT OF A PLANAR BIPOLAR TRANSISTOR (U) THOMSON COMPONENTS-MOSTEK CORP MONTGOMERYVILLE PA P MIGUELEZ 1987 N00014-86-C-2523 1/1

UNCLASSIFIED F/G 9/1 NL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1.1
1.25
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2.0
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4.0

# PROGRESS REPORT

# TECHNOLOGY DEVELOPMENT OF A PLANAR BIPOLAR TRANSISTOR

CONTRACT # N00014-86-C-2523

Reporting Period: 1 October 1986 to 1 December 1986

**CDRL ITEM A001**



THOMSON COMPONENTS - MOSTEK CORPORATION
Commerce Drive
Montgomeryville, PA 18936

# PROGRESS REPORT

1. Contract - N00014-86-C-2523

2. Project Title - Technology Development of a Planar BiPolar Transistor

3. Project Objective - Develop and demonstrate a Silicon Planar BiPolar Transistor incorporating isolation techniques to achieve an improvement in thermal resistance which supports designs for longer pulse widths and duty factors.

4. Period Covered - 1 October 1986 to 1 December 1986

5. Location of Work - Thomson Components - Mostek Corporation
Montgomeryville, PA

6. Responsible Individual - Phil Miguelez
Thomson Components - Mostek Corporation
Commerce Drive
Montgomeryville, PA 18936
(215) 362-8500

7. Milestone Chart - Updated to show work accomplished.

8. Work Accomplished

**TASK 1 - TRANSISTOR DESIGN**

A new transistor die geometry was designed incorporating top collector contacts and intrinsic backside isolation. Unique features of this design include:

* High emitter periphery to base area Figure of merit (10) vs typical L-Band geometries (4.5 - 6.5).
* "End - Fed" top collector contacts to reduce collector contact resistance.
* Individual common lead contacts to reduce common lead inductance.
* Emitter site ballasting as well as collector ballasting to minimize cell to cell temperature variations.
* Tri-layer structure consisting of an insulator sub-layer, epitaxial buried layer, and epitaxial collector top layer.

Figure 1 depicts the conceptual geometry lay-out, while Figure 2 shows details of the cell structure including proposed concentration levels. Drawings have been delivered to the mask vendor and digitizing for mask set generation is underway.

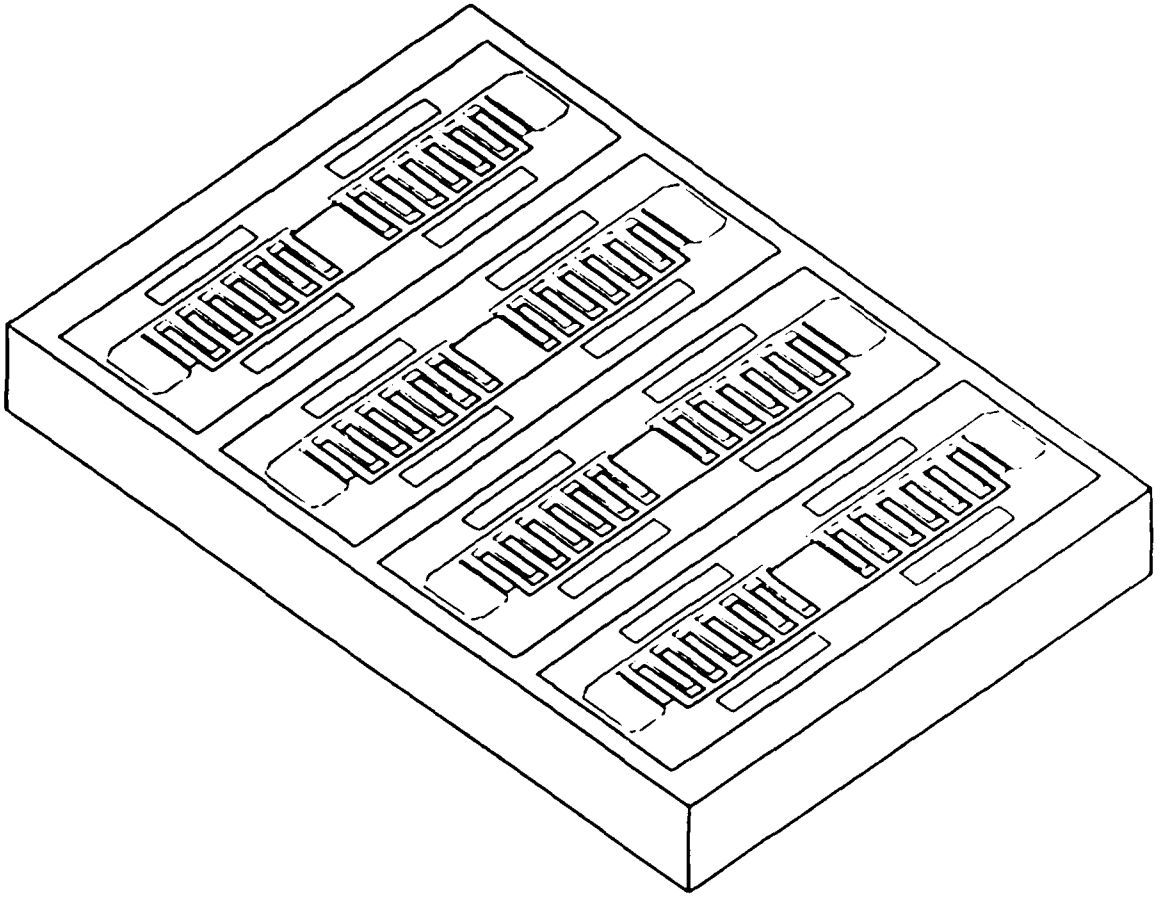
**TASK 3 - PACKAGE DESIGN**

A visit was made to the package vendor on November 20, 1986 to discuss design aspects of the proposed transistor package. It has been decided to delay final tooling of the package until preliminary RF test results can be obtained and internal metallization patterns to optimize RF performance can be defined. Package piece parts have been ordered conforming to the proposed package concept. These piece parts consisting of lead frame, alumina window frame, heat spreaders, and flanges will be assembled by TCMC in order to evaluate relative design advantages and further define the final package design.

9. Plans - Upon verification of the delivered mask set, two wafer lot starts will be initiated consisting of a top collector lot and a non-top collector (control) lot used to verify the geometry/process design.

FIGURE 1

PROPOSED ISOLATED TOP COLLECTOR GEOMETRY



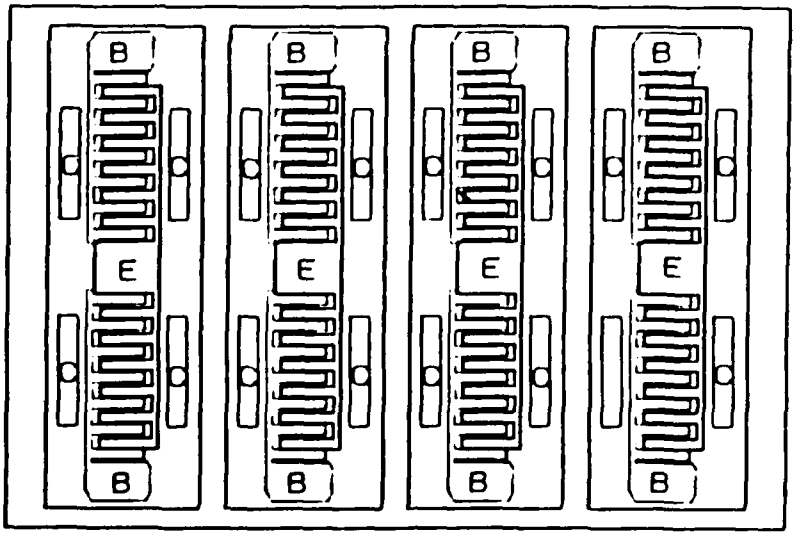


Figure #2

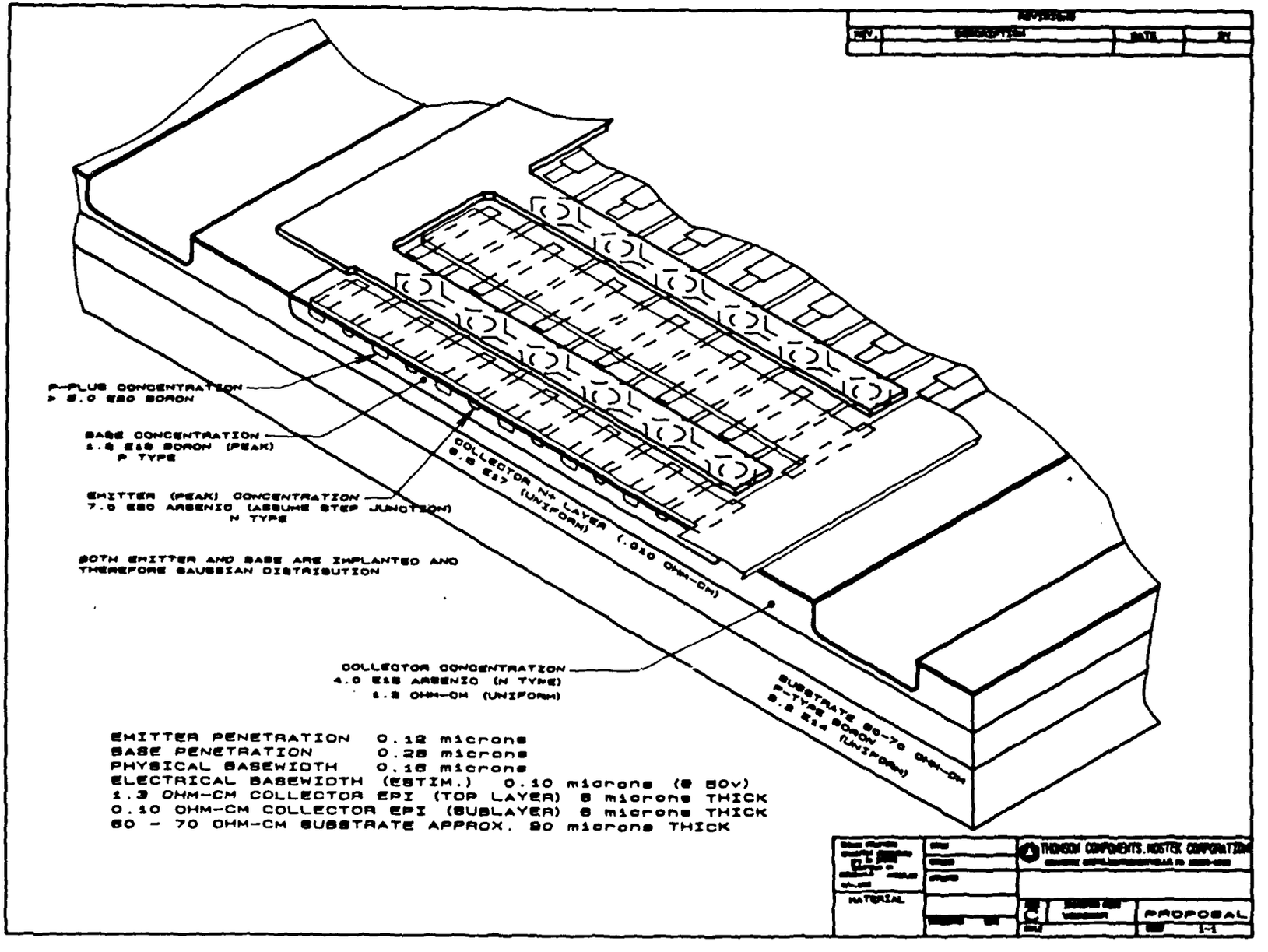
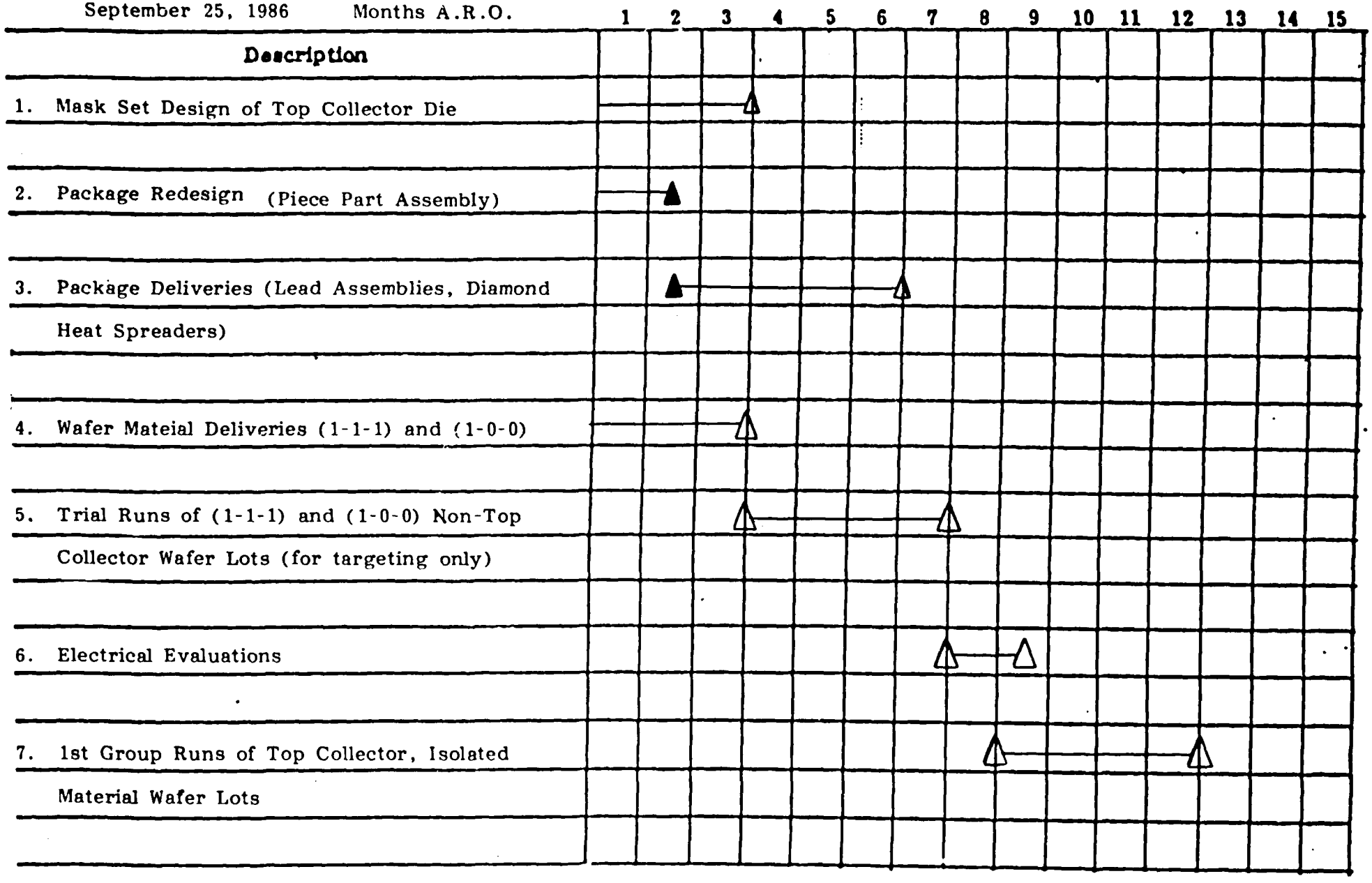

P-PLUS CONCENTRATION
> 8.0 E20 BORON
BASE CONCENTRATION
1.8 E18 BORON (PEAK)
P TYPE
EMITTER (PEAK) CONCENTRATION
7.0 E20 ARSENIC (ASSUME STEP JUNCTION)
N TYPE
BOTH EMITTER AND BASE ARE IMPLANTED AND
THEREFORE GAUSSIAN DISTRIBUTION
COLLECTOR N+ LAYER
5.5 E17 (UNIFORM)
(.010 OHM-CM)
COLLECTOR CONCENTRATION
4.0 E18 ARSENIC (N TYPE)
1.3 OHM-CM (UNIFORM)
SUBSTRATE 60-70 OHM-CM
P-TYPE BORON
5.5 E14
(UNIFORM)
EMITTER PENETRATION 0.12 microns
BASE PENETRATION 0.28 microns
PHYSICAL BASEWIDTH 0.16 microns
ELECTRICAL BASEWIDTH (ESTIM.) 0.10 microns (@ 50V)
1.3 OHM-CM COLLECTOR EPI (TOP LAYER) 6 microns THICK
0.10 OHM-CM COLLECTOR EPI (SUBLAYER) 6 microns THICK
60 - 70 OHM-CM SUBSTRATE APPROX. 90 microns THICK
MATERIAL
PROPOSAL

Figure 3

**ENGINEERING PROJECT** Isolated Collector Planar Bipolar Transistor

September 25, 1986 Months A.R.O.



## CONTRACT EXPENDITURES

1. Contract Award - $433,280.00

2. Funds Released - $155,000.00

3. Cost Summary:

| | | |
|---|---|---|
| Billing No. | 1 | |
| Month | 11/86 | |
| Total Monthly Billing | | $33,927.00 |
| Total Cummulative Billing | | $33,927.00 |
| % of Released Funds | | 21.89 |

END

DATE

FILMED

MARCH

1988

DTIC